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ABSTRACT

This study, prepared for UNESCO under its Records and Archives Management Programme (RAMP) in cooperation with the International Council on Archives (ICA), proposes a model curriculum in preservation and restoration of documents for archival agencies in developing countries. It is also intended to promote harmonization of such training with the needs of libraries, documentation, and other information centers. The primary aim of the study is to suggest a training program based upon a curriculum that will provide a scientific approach to both preservation and restoration work with the initial focus on preventive preservation. The curriculum includes activities intended to emphasize self-reliance and the ability to manage, to innovate, and to draw upon the best of other people's experience. The proposed curriculum is two-fold: (1) for specialists, i.e., college graduates who work as supervisors to organize facilities and guide staff where necessary; and (2) for technicians, i.e., non-graduate staff who actually carry out the preservation and restoration work. While different in content emphasis, the curriculum outlined for each group entails 300 hours of training spread over a 12-week period. Appendix A details eight experiments designed to encourage students to work independently which could serve as models for use by training schools. (DMC)

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A MODEL CURRICULUM FOR THE TRAINING OF SPECIALISTS IN DOCUMENT PRESERVATION AND RESTORATION: A RAMP STUDY WITH GUIDELINES

prepared by
Y.P. Kathpalia

General Information Programme and UNISIST

United Nations Educational,
Scientific and Cultural Organization

IR050754

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PREFACE

The Division of the General Information Programme of Unesco, in order to better meet the needs of Member States, particularly developing countries, in the specialized areas of records management and archives administration, has developed a long-term Records and Archives Management Programme - RAMP.

The basic elements of the RAMP programme reflect the overall themes of the General Information Programme. RAMP thus includes projects, studies and other activities intended to:

1. Promote the formulation of information policies and plans (national, regional and international).

2. Promote and disseminate methods, norms and standards for information handling.

3. Contribute to the development of information infrastructures.

4. Contribute to the development of specialized information systems in the fields of education, culture and communication, and the natural and social sciences.

5. Promote the training and education of specialists in and users of information.

The present study, prepared under contract with the International Council on Archives - ICA - is intended to assist in the development of basic training programmes and courses in document preservation and restoration, and to promote harmonization of such training both within the archival profession and within the broader information field.

Comments and suggestions regarding the study are welcomed and should be addressed to the Division of the General Information Programme, Unesco, 7 place de Fontenoy, 75700 Paris. Other studies prepared under the RAMP programme, a list of which appears at the end of this study, may also be obtained at the same address.

FOREWORD

The present study, prepared for Unesco in co-operation with the International Council on Archives, proposes a model curriculum in preservation and restoration of documents for archival agencies in developing countries. It is also intended to promote harmonization of such training with the need of libraries, documentation and other information centres.

I am grateful to Mrs Zakiah Hanum Nor, Malaysia; Mr Michael Cook, Liverpool; Mr G.P.S.H. de Silva, Sri Lanka; Mrs Lily Tan, Singapore; Mr Michel de Moel and Mr Fritz Wolff of the ICA Committee for Professional Training and Education; Mr A.M. Broom, Scottish Record Office; Mr Alan Calmes, Preservation Officer, U.S. National Archives; and Mr Joseph Hanus, Czechoslovakia, member, ICA Committee on Conservation and Restoration, for valuable suggestions.

I wish to express my appreciation to Mr Charles Kecskemeti, Executive Secretary, International Council on Archives, for encouragement and advice, and to Mr Kenneth Roberts and Mr Frank B. Evans of the Division of the General Information Programme, Unesco, for copies of reports, various studies, other reading material, as well as for the constant encouragement essential for revision and completion of the study.

Y.P. Kathpalia

1. INTRODUCTION

1.1 A worldwide survey in 1976-1977 of facilities for the preservation and restoration of archives showed that most countries lack facilities for this work.* The survey also revealed a desire amongst custodians of archives to preserve their holdings on modern scientific lines, to develop facilities for preservation and restoration work, and to train their staff in modern procedures for carrying out the work scientifically and successfully. In addition, the survey identified countries where facilities for training are available.

Training facilities

1.2 Europe and North America have reasonably adequate facilities for training. A few associations like the Society of Archivists in the United Kingdom and the Society of American Archivists in the United States of America have also taken up the task of training persons wanting to join and also for those working in the profession. In the private sector, schools like the Camberwell School of Arts and Crafts in London, conduct courses for two to three years. There are a number of such training centres in developed countries. Various archives services conduct in-service training for persons deputed by archives services in developing countries.

1.3 Among the training centres identified in developing countries are the School of Archival Studies of the National Archives of India, New Delhi; the School for Archivists at Cordoba in Argentina; and the two regional centres operating in Africa - one at Accra in Ghana, for Anglophone countries, and the other at Dakar in Senegal, for Francophone countries; both schools were set up with the aid of Unesco.

1.4 It is only at the School of Archival Studies, New Delhi, that facilities for training in both preservation and restoration are available for specialists as well as for technicians. The curriculum for these courses has developed over the years and is based not only upon needs of archives and the archival profession, but also on the experience gained in training in developing countries.

Deterioration

1.5 Large numbers of documents in developing countries are in an advanced state of deterioration due to climatic factors, internal degradation, catastrophes, improper handling, poorly designed storage areas, use of untested materials - which have done more harm than good to documents - and lack of trained staff.

1.6 There are instances in a number of countries where the trained staff have either made no efforts regarding preventive preservation of records, or else have become complacent because of lack of facilities and paucity of trained technicians. The result is for all to see. Archives have deteriorated to such an extent that they break upon being touched, storage areas remain full of dust and infested with insects, and fungus spores lie dormant awaiting favourable conditions for growth and infestation.

1.7 Another serious problem is the use of untested materials for repair by trained technicians in the absence of standardization and testing facilities. For example, some of the materials, techniques and equipment commercially available have done and can do more harm than good to documents, thereby affecting their longevity. Those that are suspect are sprays used for consolidation, i.e. resizing and strengthening; the wide range of synthetic adhesives, specially those containing polyvinyl chloride; adhesive-coated tissues (a large variety of these are on the market as a result of the rise in prices of products based upon petroleum); folders

* Y.P. Kathpalia, PGI-78/WS/14, 1978, 94 pp.

and boxes not made of acid-free materials; materials of inferior quality intended for use in restoration, such as rosin-sized paper, tissue paper, improperly formulated cellulose acetate film, etc.; and felt pens and pressure-sensitive tapes.

1.8 All of these have added to the problems of preservation and restoration, which can only be solved by the standardization of materials and procedures, equipment, methodology and training of staff, based upon a curriculum that meets the basic needs for preservation and restoration.

Aims of study

1.9 The primary aim of this study thus is to suggest a training programme based upon a curricula which will provide a scientific approach to both preservation and restoration work for the persons employed in or likely to be engaged by archives for this purpose. The initial emphasis will be on preventive preservation rather than on restoration, for such preservation not only helps prolong the keeping qualities of the documents and other archival materials, but also saves on cost. The difference between preventive preservation and restoration in terms of cost is in the ratio of 1:10 per document sheet.

1.10 The study also proposes to standardize well-known techniques and to provide impetus for the supervisory staff to develop new processes or experiment with new techniques with a view to adapting them for particular requirements. Such a step is necessary in view of the varying conditions and types of documents, of the materials on which documents are composed, and of the availability of equipment and chemicals.

1.11 Preservation and restoration facilities need planning to get better results. The staff of the school of archival agencies should have knowledge of management techniques for planning adequate facilities, for procuring equipment and materials, and for adopting and adapting the new methodology that has been developed and is available or is likely to be developed in the near future. Above all the staff should be equipped to devise plans to counteract emergencies that may arise, instead of being overpowered by disasters such as the Florence floods, earthquakes, fire, etc. The training and the curricula upon which it is based should ensure:

(a) preservation to minimize the degradation of archive materials, i.e. proper preventive preservation;

(b) restoration on scientific lines with a view to reinforcing documents with utmost speed and at a relative low cost; and

(c) standardized methodology to ensure that the trained technicians carry out the required procedures on scientific lines.

Guidelines

1.12 In view of the above considerations, the guidelines for curriculum proposed in this study have been arranged in such a manner that they can be adopted directly for specialists, i.e. supervisory staff and technicians, the persons actually engaged on work. Provision is also made for ensuring that supervisory staff will also learn management techniques to plan facilities for work and will be able to update their knowledge of techniques and other developments in the profession. Although the guidelines are primarily aimed at the training needs of developing countries, specialists in the field in developed countries may also find them of value and use.

1.13 The curriculum provides for a basic course with which all persons employed in preservation and restoration, whether in archives, libraries or documentation and information centres, should be familiar. The bibliography indicates sources of additional information which may help in understanding the various procedures indicated in the curriculum. It may also help teachers to draw up their course notes and work outlines.

II

2. TRAINING

2.1 Archives form a part of the information services of a country. It is therefore necessary that they be preserved on scientific lines and that there be appropriately trained persons for this purpose.

2.2 The staff recruited should not only be highly qualified, but should also be able to impart training in both theory and practice in preservation and restoration techniques, and to interpret the needs of different archival agencies. The centre where the training is offered should have a certain level of technology available, such as access to equipment required for preservation and restoration work, facilities for audio-visuals, etc. It would be difficult to establish a professional training scheme based upon the model curriculum described in this study in places or situations where access to these technological services does not exist. In such places it would be best to develop preventive preservation facilities.

2.3 The training should be relevant and specific to the job, and should be taught to high standards. It should be appropriate and oriented towards meeting the immediate requirements of archives, libraries and documentation or information centres; there should be basic harmonization in the training programme; and the programme should not only meet current needs but should assist specialists to solve problems that may arise in the future.

Establishment of training

2.4 It is not desirable to establish partial training schools. On the contrary, these should be fully equipped to train both types, i.e. the specialists who will act as supervisors and the technicians who will actually carry out the preservation and restoration work. Wherever the training is imparted it should have adequate funds. It should also have a building for teaching, for seminars and group discussions, and for the technical work and support services, like a library, a reading room and a lounge where students may meet to discuss various problems amongst themselves. It has been observed that where students are given opportunities to read and discuss their problems freely they do well in theory and also in practical exercises. This is reflected in the results of examinations conducted after the completion of the courses.

2.5 For training proposed the number of students should not initially be more than six. This is to ensure individual attention in practical work.

2.6 The control over the curriculum and its division into various topics should be with the school, which should be a centre where training is arranged. Similarly, conduct of examinations should be the prerogative of the school, even though the school is attached to an archives or a documentation centre. Professional training should be recognized and given due weight for recruitment and advancement.

2.7 The training should also ensure that trained persons are absorbed into the archival or other informative system, and given suitable opportunity for advancement

in the profession. Otherwise they may leave the professions for better positions elsewhere in public or private services. This could produce a situation when it would become impossible to recruit graduates and non-graduates for the recruitment and hence training in preservation and restoration of documents. Trained specialists in this field must be given status equivalent to that of other information specialists.

Qualifications

2.8 Restoration of documents is essentially a craft, and like any other craft or art it requires a long time to learn it well. It also requires constant practice to achieve proficiency. The profession therefore requires technicians who have a reasonably good education, a certain amount of talent, manual dexterity, an inquisitive mind, pride in the work in which they are engaged, integrity and respect for the valuable materials they are required to treat.

2.9 It is essential that persons selected for training should have adequate qualifications. Both graduates* for specialists or supervisory staff and non-graduates for technician posts should have a background in physical sciences.

2.10 All too frequently non-graduates, by virtue of years of service rather than proficiency in preservation and restoration, have been promoted to supervisory posts. As a result not only has the quality of the work suffered, but the institutions employing them have also not been able to introduce any new scientific methods of preservation and restoration.

Training programme

2.11 The training should start with technicians, i.e. with a subprofessional course which stresses preventive preservation, and later should introduce the professional course for specialists. This is the principle that was adopted at the School of Libraries, Archives and Documentalists (EBAD) at the University of Dakar, Senegal, and also at the School of Archival Studies of the National Archives, New Delhi, during the formative years of its training programme. At present the School at New Delhi conducts courses in preservation and restoration for both specialists and technicians. These courses are open to the professional and technical staff of libraries and documentation and information centres.

2.12 At the outset training in preservation and restoration could be associated with the International Council on Archives Regional Branches, viz. the Association of Latin American Archivists - Latin American Regional Branch of the International Council on Archives (ALA), the Arab Regional Branch of the International Council on Archives (ARBICA), the Caribbean Regional Branch of the International Council on Archives (CARBICA), the Central African Regional Branch of the International Council on Archives (CENARBICA), the Eastern and Central African Regional Branch of the International Council on Archives (ECARBICA), the Pacific Area Regional Branch of the International Council on Archives (PARBICA), the South-East Asian Regional Branch of the International Council on Archives (SARBICA), the South-West Asian Regional Branch of the International Council on Archives (SWARBICA) and the West African Regional Branch of the International Council on Archives (WARBICA). Regional and sectional training facilities already exist in some of these areas. For example, the ALA region has the school at Cordoba, Argentina, CARBICA has in-service training facilities at Jamaica, ECARBICA in Ghana, PARBICA has facilities in Australia, SARBICA has in-service facilities in Malaysia, SWARBICA in India and WARBICA in Dakar. The training school at New Delhi has also been catering for ECARBICA, SWARBICA and SARBICA, and has trained persons sent by the following countries of

* College/university graduates.

these respective regions: Lesotho, Botswana, Malawi, Uganda, Kenya, Nigeria and Sudan from ECARBICA; Bangladesh, Nepal, Afghanistan, Sri Lanka and Burma from SWARBICA; and Thailand, Malaysia, Singapore and Indonesia from SARBICA. The students from Sudan and Malawi were sponsored by the German Foundation for International Development while those from Uganda, Lesotho, Sudan, Afghanistan, Burma, were sponsored by Unesco.

2.13 Keeping in view the needs of the various developing countries and the discussions of the ICA Committee for Professional Training and Education, it is felt that the training schedule on the basis of curricula proposed (Chapter III) should extend over a period of 300 hours. The theory and practical component, in the case of specialists, should be in the ratio of 1:5, i.e. 50 hours for theory and seminars and 250 hours for intensive practical work. For technicians, i.e. subprofessionals, there should be 10 hours of theory on the methodology of the various techniques of preservation and restoration and 290 hours of intensive practical work.

2.14 Training should cover instructions in the actual processes which are carried out in an archives or a library or a documentation-information centre, and should seek to ensure that the processes used are efficient, aptly designed, and effective for the purpose. The guidelines given below deal with both the theory and practice to attain technical knowledge and understanding of the processes and techniques.

2.15 The trained person should then be expected and equipped to set up infrastructure for preservation in his institution (archives, library, etc.) upon return, and should continue to practise as in-service training in the various processes learnt during training. In the final analysis it is only continued practice that enables one to turn out quality work.

Co-operative approach

2.16 The training centre should co-operate with other national and regional centres to update the courses as needed. Such an approach will promote both standardization and research into areas of professional concern. There is a strong case for associating training in preservation and restoration of documents with the training programmes of libraries, manuscript repositories and documentation institutions. In some countries such as India this is already being done. The curriculum that follows has been drawn up with this in view. It includes activities intended to emphasize self-reliance, the ability to manage, to innovate and to draw upon the best on other peoples' experience.

III

3. CURRICULUM

3.1 Training in preservation and restoration of documents is most effective where courses for both specialists and technicians are available. The curricula proposed is twofold:

(a) for specialists, i.e. graduates* who work as supervisors to organize facilities and guide staff where necessary; and

(b) for technicians, i.e. non-graduate staff who actually carry out the preservation and restoration work.

For each group the curriculum has to be different.

* College/university graduates.

3.2 For specialists the curriculum should cover theory and practical work with stress on preventive preservation. It also provides for seminars and group discussions of various problems of preservation and restoration. These are intended to help build confidence for undertaking actual work; for the handling of machines; to help remove the doubts of technicians; to assist in handling problems seldom encountered but important to archives and libraries, such as the flood disaster in Florence, Italy; and to develop, amongst other things, management capabilities.

3.3 The curriculum provides for 50 hours of teaching with seminars and 250 hours of practical work, i.e. 300 hours spread over a period of 12 weeks.

3.4 For technicians, who actually carry out the preservation and restoration work, the curriculum lays stress on intensive practical work besides 10 hours of basic theory in the methodology of the various processes. This course also is for 300 hours spread over a period of 12 weeks.

A. CURRICULUM FOR SPECIALISTS, i.e. SUPERVISORY STAFF

1. THEORY — 250 hours

3.5 An overview is given below of the various topics on which lectures would be delivered. The stress, as far as possible in the beginning, should be on preventive preservation and on traditional methods of restoration, as many archival agencies in developing countries face serious problems of funding and have practically no facilities for restoration work. Five or six seminars on these topics are also envisaged.

Introduction to preservation and restoration — 1 lecture

3.6 Definitions of terms such as preservation and restoration, their importance for documents, and application of each approach, in addition to the other general points and principles.

Documentary materials — 3 lectures

3.7 Documents consist traditionally of paper and ink. An introduction to paper manufacturing both earlier and in the modern period, as well as to inks used from early times until the present. The materials that go into manufacturing and their effects on the end product. Ancient writing materials, the history of paper and the book, and modern materials on which documents are being created: microforms, tapes and other audio-visual forms.

Preventive preservation — 8 lectures

3.8 The type and nature of deterioration brought about by natural ageing; accelerated ageing; biological agents - fungus, foxing, insects and rodents; physical agents - heat, light and moisture (relative humidity); chemical agents - pollution, atmospheric gases, dust, internal acidity in paper; acidity contributed by inks; methods both preventive and curative to counteract deterioration, including techniques like air-cleaning, disinfection, fumigation, humidification of folded documents and flattening; deteriorative effect on microfilms, tapes, discs and audio-visual materials and methods for their preservation.

Storage — 4 lectures

3.9 Use of docket or file covers - acid free - for loose papers; group of files in document boxes; types of document boxes; horizontal or vertical storage;

advantages and disadvantages; storage in bundle form - disadvantages and advantages; storage of volumes on shelves; storage of seals, photographs - positive and negative, microfilms, tapes, sound recordings, other audio-visual materials; packing and labelling.

Shelving and storage environment — 2 lectures

3.10 Types of shelving; advantages of each; specifications; utility; compactus shelving; its advantages; cost factors; standards for shelving; storage environment; control of temperature and humidity; air circulation; air-wash for polluted air; air-conditioning and its advantages; storage environment in non-conditioned atmosphere; steps against light and exposure to heat and dampness.

Building — 3 lectures

3.11 Existing building; steps for improvement of storage environment; improvement of air circulation; designing and provision of essential and functional requirements of an archives vis-à-vis location of storage areas; protection against deteriorating agents, short circuiting, floods, earthquakes, riots, vandalism; factors for designing a building for housing archives.

Protection against fire and theft — 2 lectures

3.12 Fire prevention; fire detection - heat detectors, smoke detectors; fire-fighting; security measures against theft.

Importance of standardization in preservation — 2 lectures

3.13 Standards for paper, inks, films, tapes; standards for buildings and their use, how these help in preservation; proper packings; storage and restoration.

First aid following disasters, fire, floods — 2 lectures

3.14 Salvaging water-soaked and fire-damaged documents; first-aid steps and long-term methods of preservation; use of vacuum and deep-freezing for water-soaked documents.

Health and safety in workshop — 2 lectures

3.15 Proper air circulation; precautions against obnoxious gases; steps against accidental fire and poisoning; first-aid measures.

Restoration — 8 lectures

3.16 Principles of repair; deacidification - aqueous, non-aqueous and gaseous; flattening; restoration methodology of various traditional processes, advantages and disadvantages of each; resizing; solvent lamination; machine lamination; leaf-casting; encapsulation; their methodology and precautions to be taken while carrying out restoration by these processes; adhesives of various kinds; their action, preparation for restoration processes; specifications for purchase.

Binding of repaired documents and rebinding — 2 lectures

3.17 Binding materials; techniques; deterioration and preservation of binding and binding materials; leather, parchment; vellum; rebinding.

Cost comparison of various processes — 2 lectures

3.18 Preventive preservation processes; restoration processes - maximum protection at minimum cost.

Planning of a preservation unit — 3 lectures

3.19 Organization, management and planning; space; location; provision of hot and cold running water; provision of a fume-hood; equipment room; machinery room; restoration facilities, including furniture for the purpose, space for deacidification and drying of documents; procurement of equipment; machines; chemicals and provision for air-cleaning and fumigation facilities; work-flow pattern.

2. PRACTICAL WORK — 250 hours

3.20 The practical work programme for specialists should include the topics detailed below.

Fumigation techniques

3.21 Various processes including modern processes against insect infestation, also against fungus infestation.

Cleaning - manual and mechanical

3.22 Use of vacuum cleaners in storage areas, cleaning by air-cleaning unit or vacuum cleaners after fumigation of acquired archives; cleaning using other methods (brushes, etc.).

Identification of components of paper

3.23 To understand keeping qualities, it is essential to know about and recognize the materials used in paper documents such as fibres, filling materials, sizing materials like resin, gelatine and starch. See appendix.

Determination of acidity

3.24 Using (a) universal indicator, and (b) pH meter. See appendix.

Deacidification

3.25 Various processes like aqueous, non-aqueous and gaseous.

Resizing and flattening

3.26 Resizing of a document in otherwise good condition, various techniques depending upon type of paper and ink; flattening by rotary iron, electric iron or in a hand or nipping press.

Restoration

3.27 Use of traditional and modern processes of restoration; repair with tissue paper, silk chiffon; mounting; solvent lamination; machine lamination using heat and pressure; encapsulation; leaf-casting technique. Stress initially should be laid on traditional processes; training in modern processes should be with a view to the availability of equipment and materials, funding, etc.

Binding of repaired documents

3.28 Gathering and guarding of repaired sheets; use of 'get-in' paper; stitching - flexible and other types; stitching in file covers; binding and tooling; preservation of binding materials; rebinding of volumes when backs have given way, i.e. caved in, or covers have come apart.

Mounting of maps and charts

3.29 Mounting on paper, cloth with adhesives; mounting using solvent/machine lamination.

Deciphering of faded documents

3.30 Use of ultra-violet rays; photographing written documents using filters.

Operation of various equipment

3.31 Variety of equipment like presses - various types; trimmers and cutters; drying oven; pH meter; binding implements; ultra-violet lamp; cameras; fumigation chamber; humidifiers, air-cleaning equipment; lamination, etc. (Details of the various equipment required for preservation and restoration will be dealt with in a future RAMP study by Unesco).

B. CURRICULUM FOR TECHNICIANS, i.e. NON-GRADUATES 300 hours

3.32 The stress here would be on practical work in the areas detailed below. In addition, lectures on the techniques for carrying out the practical work would form part of the curriculum. The lectures would extend over 10 hours, i.e. 10 lectures and the practical work over 290 hours, under supervision, with the stress on proper handling of documents and the equipment for quality work. The lectures should be illustrated with audio-visual material, depicting the various steps of the practical work. The practical work will include the following topics.

Use of insecticides, fungicides and fumigation processes

3.33 Archives in tropical countries are faced with problems of insect infestation and fungus growth on records, and preventive steps have to be taken to check the threat of insects and fungus in the stack area. Correct use of insecticides and insecticidal sprays, use of fungicides and sprays, fumigation against insect infestation and fungus growth respectively. Stress would mainly be on preventive preservation.

Cleaning

3.34 Use of vacuum cleaners to remove dust from records in storage areas, cleanliness in the storage room and cleaning of fumigated records with the help of air-cleaning unit, vacuum cleaners, brushes, etc.

Deacidification

3.35 Deacidification using aqueous, non-aqueous and gaseous processes as directed; precautions during deacidification.

Resizing and flattening

3.36 Resizing of documents otherwise in good condition; flattening after drying using various techniques.

Preparation of adhesives

3.37 Composition of adhesives for restoration and binding work, respectively, and their preparation.

Restoration

3.38 Stress on manual procedures, like repairs using tissue paper or silk chiffon, mounting on hand-made paper; solvent lamination - correct use and precautions; machine lamination using heat and pressure; encapsulation and leaf-casting techniques; procedure for mounting of maps, repair of seals, etc.

Rebinding

3.39 Techniques for rebinding volumes whose backs have given way or have come apart.

Binding of repaired documents

3.40 Technique of various steps; varieties of stitching, binding, tooling; preservation of leather, parchment and vellum; other materials used for binding.

Preparation of jackets, document boxes

3.41 Technique and methodology.

Labelling of boxes

3.42 Necessity for identification of contents, servicing and proper arrangement on shelves.

Preparation of exhibits for display

3.43 Stress on mounting, display and framing; prevention of damage to documents during exhibition; light filters.

Handling of microfilms, tapes and audio-visual materials

3.44 Methodology to prevent damage and deterioration; techniques for proper handling and storage; prevention of damage during use.

Servicing of records

3.45 Preparation of lists; arrangement and storage of records on shelves; ensuring proper storage environment.

3.46 The training should continue as in-service training in the concerned institution, since practice will build confidence in technicians and help them not only to handle difficult jobs but also enable them to turn out quality work.

IV

4. SUMMARY AND GUIDELINES

4.1 A recent survey of facilities for preservation and restoration reveals that archivists in developing countries are aware of the need for such facilities. Vast qualities of documents in developing countries are in an advanced state of deterioration and need immediate attention on scientific lines. In some cases the damage has been done because of use of materials of doubtful values and of wrong techniques (paragraphs 1.1-1.7).

4.2 There is a serious need to standardize the preservation and restoration techniques as far as methodology is concerned, to promote the use of tested and approved materials, and to provide impetus for supervisory staffs to develop new processes or experiment with new techniques and adapt them to their own needs. All these objectives could be promoted through greater harmonization of the training programmes in the information field. In addition, it is essential to plan and develop specialized facilities for preservation and restoration, and to train the persons deployed for such work in archives, libraries and other information centres (paragraphs 1.8-1.13).

4.3 However, it is not desirable to establish training schools with inadequate programmes or at places where adequate funds and facilities are not available. Control over the curricula and its division into various topics should be with the school or centre where the training is arranged (paragraphs 2.4-2.6).

4.4 In the beginning training could be associated with the ICA Regional Branches, viz. ALA, ARBICA, CARBICA, CENARBICA, ECARBICA, PARBICA, SARBICA, SWARBICA and WARBICA. Adequate training facilities in some of these regional areas already exist (paragraph 2.12).

4.5 The training, in addition to turning out trained staff, should ensure that trained persons are able to carry out their respective jobs (paragraph 2.15).

4.6 The curricula envisaged is twofold:

(a) <u>for specialists</u>, i.e. graduates who work as supervisors to organize facilities and guide staff where necessary; and

(b) <u>for technicians</u>, i.e. non-graduate staff who actually carry out the preservation and restoration work (paragraph 3.1).

A. CURRICULUM FOR SPECIALISTS, i.e. GRADUATES — 300 hours

THEORY — 50 hours

(i) Introduction to preservation and restoration.

(ii) Material basis of documents, including microforms, tapes and other audio-visual materials.

(iii) Preventive preservation.

(iv) Storage - various types.

(v) Shelving and storage environment.

(vi) Buildings - stress on existing ones for scientific preservation.

(vii) Importance of standardization in preservation work.

(viii) First aid following disasters - flood, fire, etc.

(ix) Health and safety in the workshop.

(x) Restoration - various techniques and methodology.

(xi) Binding of repaired documents and rebinding.

(xii) Cost comparison of various processes.

(xiii) Planning of a preservation unit.

(xiv) Seminars (five or six on the above topics) (paragraphs 3.5-3.19).

PRACTICAL WORK 250 hours

(i) Fumigation techniques.

(ii) Cleaning - manual and mechanical.

(iii) Identification of components of paper.

(iv) Determination of acidity.

(v) Deacidification.

(vi) Resizing and flattening.

(vii) Restoration - traditional and modern encapsulation and leaf-casting.

(viii) Binding of repaired documents and rebinding.

(ix) Mounting of maps and charts.

(x) Deciphering of faded documents.

(xi) Operation of various equipment (paragraphs 3.21-3.31)

B. CURRICULUM FOR TECHNICIANS, i.e. NON-GRADUATES 300 hours

(i) Use of insecticides, fungicides and fumigation processes.

(ii) Cleaning - vacuum and otherwise.

(iii) Deacidification.

(iv) Resizing and flattening.

(v) Preparation of adhesives.

(vi) Restoration of documents on paper, parchment and vellum, palm leaf, birch bark.

(vii) Restoration of seals; mounting of maps, charts, etc.

(viii) Binding of repaired documents and rebinding.

(ix) Preparation of jackets; document boxes.

(x) Labelling of boxes.

(xi) Preparation of exhibits for display.

(xii) Arrangement and storage of records in boxes; in cabinets; on shelves.

(xiii) Handling of microforms.

(xiv) Servicing of records.

(xv) Operation of equipment (paragraphs 3.32-3.45).

4.7 After completion of the course(s), training should continue, specially in case of technicians, as in-service training in the concerned institutions. Such a programme would help create confidence in technicians, help them to handle difficult jobs and enable them to turn out quality work (paragraph 3.46).

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APPENDIX A

The author conducted a two-week course in preventive preservation at Baghdad at the invitation of ICCROM in 1981. It was observed that the course became meaningful where slides illustrating the various facets of preventive preservation were shown and explained to illustrate the lectures. To encourage students to work on their own a number of experiments were devised. Eight such experiments, which the author feels would be of help as indicated in the curriculum, are detailed in this appendix as a model for adoption or adaptation by training schools. These can be revised or improved upon, depending upon local needs and advancement in the techniques of preservation and restoration. Similar experiments may be developed for other topics.

PRESERVATION OF ARCHIVE MATERIALS

Experiment No. 1: Structure of paper

AIM | Identification of different kinds of fibres used for formation of paper by their morphological characteristics.

Paper may either consist of pure cellulose, derived from cotton or linen or chemical pulp, or

may consist of mechanical wood pulp containing cellulose and bonding materials such as lignin, hemicellulose, etc.;

pure cellulose fibres and those of mechanical pulp can be recognized under a microscope.

Observe and recognize through a microscope (magnification x 125) cellulose fibres derived from:

(a) hard wood;

(b) soft wood;

(c) cotton;

also mechanical wood pulp (fibres of wood which have been mechanically devised).

Record your results as cellulose fibres from:

(a) wood; (Slide No. 1)

(b) cotton; and (Slide No. 2)

(c) mechanical wood pulp (Slide No. 3)

Experiment No. 2: Detection of lignin in paper

AIM | Detection of lignin in wood pulp.

Permanent paper is made out of pure cellulose fibres derived from cotton, linen or chemical pulp. Lignin (which acts as a binding material of cellulose fibre) is present in mechanical wood pulp. It can also be present as an impurity in chemical pulp, if the same has not been properly prepared from hard wood/soft wood. Usually pure cellulose fibres obtained from chemical pulp do not contain lignin.

Two sheets of paper will be given. Place a drop of phloroglucinol stain (solution) directly on the sheet of paper; the appearance of a pink-violet colour indicates the presence of lignin.

Record your result/observation.

Note: Phloroglucinol stain is prepared in solution form from phloroglucinol, alcohol and hydrochloric acid (conc.).

ADDITIONAL INFORMATION FOR EXPERIMENTS NOS 1 AND 2

Reagent tests for paper-fibre identification

Fibres	Iodine	Zinc-chloro-iodine solution	Phloro-glucinol solution	Harzberg's stain
Cotton and linen	Light to dark brown	Strong wine red	-	Red
Chemical wood	Colourless to light brown	Blue	-	Blue
Mechanical wood	Yellow to brown	Yellow	Dark red	Yellow

These tests help to supplement the information on identification of fibres.

Experiment No. 3: Identification of sizing materials

AIM

Different materials are used for the sizing of paper during its manufacture. These are mainly gelatin, resin and starch. We can detect the presence of these sizes in paper by chemical tests.

These tests are carried out either directly on paper or on a liquid extract of the size obtained from paper by chemical processes.

The test on paper can be carried out to detect the presence of either starch or rosin. Two paper samples will be given for the purpose.

(a) Starch

Place a drop of solution of iodine (1 per cent) and potassium iodine (5 per cent) on paper; the appearance of a blue-violet colour indicates the presence of starch.

(b) Rosin

Place a drop of concentrated solution of glucose (sugar) on paper and then add a drop of sulphuric acid ($H_2 SO_4$). The appearance of a red colour turning brown indicates the presence of rosin. Rosin can also be detected by the characteristic ring made by a drop of ether on the sheet under examination.

Test on liquid extract (i.e. in solution).

(a) Gelatin

(i) in the case of newspaper sheets, make an extract with a solution of caustic soda. To this extract add nitric acid and ammonium molybdate. The appearance of white precipitate indicates the presence of gelatin sizing;

(ii) in the case of an old paper, make an extract with boiling water. To this extract add nitric acid and ammonium molybdate as in (i) above. The appearance of a white precipitate indicates the presence of gelatin sizing.

(b) Starch

Make an extract of a paper sample in boiling water. To the cool extract add a drop of iodine solution. The appearance of a blue colour indicates the presence of starch.

To another portion add iodine and potassium iodide solution. The appearance of a blue-violet colour indicates the presence of starch.

(c) Rosin

Make an extract of a paper sample with acetic anhydride. To this extract add very carefully a drop of concentrated sulphuric acid ($H_2 SO_4$). The appearance of a red colour turning to brown indicates the presence of rosin.

Note: 1. Also see the enclosed chart.

2. Extracts of various samples will be provided.

Chemical analysis on sizing of paper

Type of Sizing	Gelatin proteins	Starch		Rosin	
Reaction done directly on paper	No	Yes	No	Yes	No
Way of extraction	Newspaper: caustic soda Old paper: boiling water		Boiling water		Acetic anhydride
Reactive agent	Nitric acid and ammonium molybdate	Iodine and potassium iodide	Iodine and potassium iodide	Add glucose then sulphuric acid	Concentrated sulphuric acid
Result	White precipitate	Blue-violet colour	Blue-violet colour	Red colour then brown	Red colour then brown

Experiment No. 4: Determination of acidity

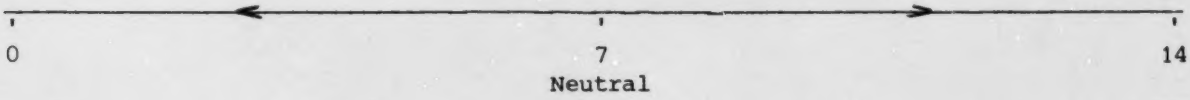
AIM

One of the major causes of deterioration of paper is acidity, which is due to a number of factors such as use of impure cellulose, rosin-alum sizing, residual chemicals left in paper due to improper manufacture, environmental conditions, use of acidic inks, etc. It is essential to know if paper is highly acidic, slightly acidic, neutral or alkaline.

Acidity is determined with a pH testing solution. A drop of this solution applied to a piece of paper gives an indication of the approximate acidity by the resulting colour.

Acidity is indicated on a pH scale from 0 to 14. The mid point 7 indicates neutral, points 7 to 14 alkalinity and 0 to 7 acidity. The reading obtained is a true measure of acidity in paper.

pH scale



Add a drop of chlorophenol red to paper. Allow it to soak. If the spot turns yellow the paper is acidic (pH less than 6); a grey-green, green or yellow-green colour indicates mild acidity (pH 6 to 6.7); purple colour indicates neutral or alkaline (pH 6.7 +).

Chart

Colour	pH	Conclusion
Yellow	Less than 6.0	Acidic
Grey-green) Green) Yellow-green)	6.0 to 6.7	Slightly acidic
Purple	6.7 +	Near neutral or alkaline

The degree of acidity is estimated with the help of a wide range indicator. This indicator enables pH to be measured from pH 4.0 to pH 9.0 in half-unit intervals (i.e. 5.0, 5.5, 6.0, etc.) by the resulting colour and the tone of that colour.

Add a drop of the reagent to the water extract of the paper sample. Suck the solution in a capillary and compare the colour with the pH colour chart.

Experiment No. 5: Neutralization of acidity

AIM

As acids are very damaging for paper they have to be neutralized. One of the processes uses carbonate as a neutralizing agent. You will see why.

Sulphuric acid can be neutralized by a base (for example Na OH) or by a carbonate (Mg CO_3) that, though a salt, can act as a free base. Sulphuric acid will be added, cubic centimeter by cubic centimeter, to one beaker containing caustic soda and to another containing magnesium carborate.

After each addition read the pH and enter it on the following table:

cc H_2 SO_4	pH		cc H_2 SO_4	pH	
	Na OH	Mg CO_3		Na OH	Mg CO_3

Draw the graphs:

cc H_2 SO_4 per pH in Na OH

cc H_2 SO_4 per pH in Mg CO_3

write your conclusions.

Experiment No. 6: Grain of paper

AIM

Machine-made paper has two directions, one machine direction, i.e. the direction in which fibres align or lie during the process of manufacture, also called grain of the paper, and the other cross direction, this direction is perpendicular to the machine direction. Expansion and contraction of paper is greater in one direction and so also is the strength. For testing purposes and also for restoration it is essential to know the grain of the paper, i.e. the machine direction of the paper of the direction in which the fibres are aligned.

Cut a paper (6" x 6"). Moisten by spraying water on one side. The paper will soon roll itself in a tube form or take a ◡ shape. The axis of the tube indicates the grain, i.e. the machine direction.

The strength of machine-made paper is much greater in one direction than the other. Tear a sheet first along the vertical and then the horizontal axis of the sheet, i.e. tear the sheet both ways in rapid succession. The greater resistance will be felt in the cross direction.

The tensile strength shows similar differences, being considerably greater in the machine direction.

Cut a paper 5" square (5" x 5"). Immerse it in water for exactly five minutes. Then rapidly press between sheets of blotting-paper. Measure the new dimensions. The increase in one direction (one cross direction) will be considerably more than the other. In certain cases the increase is approximately ten times the increase in the other direction (machine direction).

Experiment No. 7: Mechanical strength of paper

AIM

Measurement of the mechanical strength of paper under different conditions to evaluate the durability and state of conservation.

The quality of paper and its suitability to ensure continual usage evidently depend upon the characteristics of mechanical strength. Furthermore, a decrease in these characteristics is indicative of the aging decay of paper and then of its permanence.

See the execution of the following tests, both in the grain (machine) and cross (transverse) directions:

tensile strength and stretch;

tear strength;

folding endurance.

Experiment No. 8: Effect of deteriorating agents' identification

AIM

Depending upon its nature and environmental conditions paper is subject to attack from several sources: heat, sunlight, moisture, dust, acidity, etc. Samples/photographs/slides will be shown to illustrate such deterioration. Identify the damage.

Study the slides/photographs/samples and identify the damage.

Stimulate aging of paper by heat/sunlight/electric light (fluourescent or tungsten) and record observation.

Wet a paper sample. Cover it with waxed paper or keep it in a desiccator having 85 per cent humidity and observe the formation of fungus growth.

Take bound volumes. Clean them with a domestic-type vacuum cleaner and observe the fine dust particles that have been collected.

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